DOCUMENT RESUME

ED 331 554 JC 910 230

AUTHOR Thompson, Mary J.; O'Brien, Terrance P.
TITLE Learning Styles and Achievement in Postsecondary Classrooms.
PUB DATE 3 Apr 91
NOTE 18p.; Paper presented at the Annual Conference of the American Educational Research Association (72nd, Chicago, IL, April 3-7, 1991).
PUB TYPE Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Adult Students; Age; Age Differences; Analysis of Variance; Cognitive Measurement; *Cognitive Style; Community Colleges; *Grades (Scholastic); *Grading; Personality Traits; Sex; Teacher Behavior; Teacher Influence; *Teacher Student Relationship; *Teaching Styles; Two Year Colleges
IDENTIFIERS *Gregorc Style Delineator

ABSTRACT

Considerable study has been focused on relationships between learning styles and other characteristics and conditions, such as teaching styles, achievement, student age, and student gender. In 1991, a study was conducted on two campuses of a comprehensive community college in the southeast to measure the effect on course grades of the relationship between matched and mismatched teaching and learning styles, and between learning styles and student age and gender. The Gregorc Style Delineator (GSD) was employed to determine the dominant styles of both teachers (N=16) and students (N=207). GSD uses a quaternary design to place study subjects in one of the following learning styles: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR). Data from the study were analyzed using two analysis of variance (ANOVA) models. In the first ANOVA model, significant main effects were manifested in regard to teaching style and age group. In addition, significant interaction effects were observed between teaching style and student age group (i.e., CS, AS, and AR teachers assigned higher grades to students 25 years of age and older, while the pattern for grades assigned by CR teachers was reversed). Similar effects were observed between teaching style and student gender. In the second ANOVA model, no significant main effects were present for either student learning style or matched and mismatched conditions. However, analysis of data suggested that students whose learning styles were mismatched with the styles of their teachers tended to receive higher grades. A 24-item bibliography is included. (JMC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED331554

Learning Styles and Achievement in Postsecondary Classrooms

Mary J. Thompson, D.Ed
Staff Development Specialist
Division of Vocational, Adult, & Community Education
Florida Department of Education
1101 Florida Education Center
325 W. Gaines Street
Tallahassee, Florida 32399-0400

Terrance P. O'Brien, Ph.D
Associate Professor
Vocational and Adult Education
Auburn University
Auburn, Alabama 36849-5526

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
M. J. Thompson
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Paper presented at the annual conference of the
American Educational Research Association
Chicago, April 3, 1991

Running head: LEARNING STYLES

TC910230

BEST COPY AVAILABLE

Learning Styles and Achievement in Postsecondary Classrooms

Learning styles have been the focus of considerable study, attracting the interest of researchers in a number of schools, colleges, and universities. They are defined as "cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Keefe, 1982, p. 44). Claxton and Murrell (1987) have published an excellent overview of research in the field and implications for educational practice, examining learning styles at four levels: (a) personality, (b) information processing, (c) social interaction, and (d) instructional methods. They suggest that research is needed to determine the actual impact on learning when teaching methods are incongruent with a student's style. They also indicate that research is needed which focuses on the interaction between learning style, developmental stage, disciplinary perspectives, and epistemology. Through such research, we may develop a better understanding of the teaching and learning process and gain insights which would enable us to improve instruction. A number of significant relationships have been identified between learning styles incorporated in various models and other characteristics and conditions, including teaching styles, student learning styles and achievement, congruence with teaching styles, student age, and student gender.

Teaching Styles

Witkin (1976) established the basic premise that one's teaching style is determined by one's learning style preferences. In other words, one teaches the way in which one likes to learn. To the extent to which this premise is true, it is important for us to learn more about the behavioral patterns of teachers exhibiting different teaching styles. In the same report, Witkin also addressed the issue of students and teachers being matched and mismatched. He reported findings indicating that under matched conditions the attitudes of students and teachers toward one another were significantly more positive than under mismatched conditions.

Thompson (1989) found that exemplary industrial education instructors used 72% of the instructional methods and program management practices attributed to their modal teaching (learning) style. Although the instructors displayed behaviors associated with their dominant learning style, they also consistently chose teaching methods related to other learning style types, thus matching their teaching methods to the learning styles of their students.

Matching and Student Achievement

Research on learning styles suggests that matching can be done by matching teachers and students of the same style, matching instructional method or learning activity and student style, and matching student style with the amount of structure provided by the teachers. Research findings, however, are inconclusive as to whether matching in any of these ways increases student learning

and achievement. Among those researchers who provide evidence that matched conditions result in increased achievement and improved attitudes toward instruction are Canfield (1980), Dunn (1982), and Abraham (1985). Included in those who offer evidence that there is no association between matching and improvements of any sort are Adams & McLeod (1979), Ballard (1980), and Fox (1984). These are only a few representative studies which could be identified to support either side of the question.

Student Styles and Achievement

A related line of inquiry is whether students with different learning styles tend to attain higher levels of achievement in general. Research utilizing the Myers-Briggs Type Indicator have revealed a number of interesting findings involving academic achievement. Martray (1971) found that the introversion-extroversion dimension was associated with variation in ability to retain complex verbal material. McCaulley and Natter (1980) demonstrated that intuitive types scored significantly higher than sensing types on measures involving reading, writing, theory, and abstraction. Lawrence (1984), among other, confirmed a correlation between the judging dimension and qualities related to academic success in college.

O'Brien (1991), using the Gregorc Style Delineator, identified findings which suggested that the abstract-sequential dimension was related to academic success in college. In another study, using the Group Embedded Figures Test, O'Brien & Wilkinson (in press) found that among graduates of an associate degree nursing program, field independent persons 36 years of age and

older scored significantly higher on the national nursing licensing examination than their field dependent counterparts, as well as students in all other age groups.

Learning Styles and Student Age

The interaction effect between learning style and age reported in the O'Brien & Wilkinson study is interesting in context of other research addressing the relation between style and age. Developmental curves for the field independence dimension were demonstrated by Witkin, Goodenough, & Karp (1967). Ommen, Brainard, and Canfield (1979) found dramatic learning style differences between younger and older students. Merritt (1983) identified significant differences between two groups of nursing students and suggested consideration be given to the development of alternative teaching and learning methods for experienced, older learners.

Learning Styles and Student Gender

The potential relationship between student gender and learning style was identified by Witkin's (1976) observation that males tended to be more field independent than females. O'Brien (1991) found that males tended to score significantly higher on the abstract-sequential and concrete-random scales than females, while females tended to score significantly higher on the abstract-random scale.

Gregorc's Learning Styles Model

One of the most recently developed and widely cited learning styles assessment instruments is the Gregorc Style Delineator (Gregorc, 1982a). The instrument represents an evolution of Gregorc's mediation ability theory which states that "the human mind has channels through which it receives and expresses information most efficiently and effectively" (Gregorc, 1982b, p.5). It is purported to measure the mediation (cognitive)

abilities of perception and ordering. Perception is represented as a bipolar continuum ranging from abstract to concrete. Ordering is represented as a bipolar continuum ranging from sequence to random. Using a quaternary design, Gregorc combines these abilities to form four mediation channels or learning styles: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR). He suggests that while all individuals possess some base level of ability in all four dimensions, most individuals exhibit a natural predisposition toward one or two of the styles and that these predispositions "affect not only how we view the world and ourselves, but, also, how we are perceived by that world" (Gregorc, 1982b, p. 6). In An Adult's Guide to Style (Gregorc, 1982b), Gregorc outlines the distinguishing traits and behaviors of persons dominant in each of the four learning styles.

Purpose of the Study

The study was designed to investigate the effects of teaching styles, student learning styles, matched and mismatched conditions, as well as student age and gender in relation to course grades in postsecondary education. The Gregorc Style Delineator was utilized to determine the dominant styles of both teachers and students. Course grades assigned by the postsecondary teachers served as the dependent variable in the testing of two analysis of variance models incorporating different configurations of the independent variables. Specifically, the research questions addressed were:

1. Do teachers exhibiting different modal teaching (learning) styles tend to differ significantly in their assignment of student grades?
2. Do students exhibiting different modal learning styles tend to receive significantly different grades?

3. Do students 25 years of age and older tend to receive significantly different grades than younger students?
4. Do students of different gender tend to receive significantly different grades?
5. In relation to assigned grades, are there any interaction effects between teaching style and: (a) student learning style, (b) student age, and (c) student gender?
6. Do students whose learning styles match the styles of their respective teachers tend to receive significantly different grades than students who are mismatched?

Methodology

Subjects

The study was conducted on two campuses of a comprehensive community college in the southeast. Eight teachers from each campus were selected for inclusion in the study based on their teaching (learning) style and the strength of the dominance of that style as measured by the Gregorc Style Delineator. Two teachers from each campus were selected in each of the four styles, for a total teacher sample of 16. In order to be selected, a teacher had to be among the most dominant in his or her respective style of the teachers at his or her institution and had to exhibit "pointy-head dominance" which Gregorc defines as a score on the dominant scale from 27-40 (Gregorc, 1982b, p.14). The teachers included in this sample exhibited dominant style scores ranging from 31 to 40, with an average score of 35.

A single intact class taught by each teacher during the quarter in which the study was conducted was selected to obtain the student sample. The result was a total of 207 subjects in the student sample, of which 73 (35%) were CS, 25 (12%) were AS, 47 (23%) were AR, 40 (19%) were CR, and 22 (11%) were BI (bimodal;

exhibiting tie scores on the two highest scales). In terms of age and gender, 147 (71%) of the students were under the age of 25, 60 (29%) were 25 and older, 87 (42%) were males, and 120 (58%) were females. Of the total sample, 49 (24%) were matched with the teaching styles of their teachers while 158 (76%) were mismatched; a distribution one might expect according to the laws of probability.

Instrumentation

The Gregorc Style Delineator (1982a) was used to assess the styles of both teachers and students. Gregorc (1982c) reported reliability coefficients ranging from .89 for the AS scale to .93 for the CR scale and predictive validity correlations ranging from .55 to .76. Joniak and Isaksen (1988) reported substantially lower alpha coefficients ranging from .23 to .66 and described the results of an exploratory factor analysis in which factors were not readily interpretable and the issue of construct (dimensional) validity was unresolved. O'Brien (1990) found reliability coefficients of .64 for the CS scale, .51 for the AS scale, .61 for the AR scale, and .63 for the CR scale. In the same study, confirmatory factor analysis indicated that while all of the separate items did not serve well as measures of their respective scales, jointly they meet minimal standards for factor definition and provide adequate measurement scales for the four styles.

Procedures

The instrument was administered to all teachers at the two campuses in specially convened faculty meetings. Following these administrations, the 16 subjects in the teacher sample were selected according to their respective styles and dominance in those styles. One intact class taught by each teacher was then selected and the Gregorc Style Delineator was administered to the students in that class. Student age and gender data were

collected concurrently, with age coded dichotomously. At the end of the quarter, teachers provided course grades in numeric form.

Data Analysis

Resultant data were analyzed according to two analysis of variance (ANOVA) models using SAS Release 5.15 (SAS Institute, 1988). Duncan's multiple range test was employed for post hoc testing as appropriate. The first ANOVA model was designed to address research questions one through five and incorporated four independent variables, three potential secondary interactions, and the single dependent variable of course grade. A second ANOVA model tested considered only the independent variables of student learning styles, match/mismatch of students with the styles of their respective teachers, and the interaction between those two variables. This model addressed research question six and was included in the analysis due to the many speculations and conflicting findings on this issue present in the related literature.

Results

A number of interesting findings emerged from testing the two ANOVA models considered in this study. In the first model, significant main effects were manifested in regard to the teaching style and age group variables. Significant interaction effects were also observed between teaching style and student age group, as well as between teaching style and student gender. In the second model, no significant main effects were observed for either student learning style or match/mismatch. An intriguing effect did emerge, however, in the interaction of these two variables.

Insert Table 1 about here

Table 1 presents the results associated with the analysis of the first ANOVA model. In this model, teaching style ($F = 5.30$, $p = .00$) and age group ($F = 6.97$, $p = .01$) emerged as significant main effects. Duncan's multiple range test revealed that CS teachers assigned significantly lower grades to students than did teachers dominant in any of the other three Gregorc styles. Post hoc testing also revealed that students 25 years of age and older received significantly higher grades than did younger students. Significant interaction effects were observed between teaching style and age group ($F = 4.04$, $p = .01$) and between teaching style and gender ($F = 4.65$, $p = .00$). A subsequent inspection of mean grades assigned by the four categories of teachers in relation to the two age groups indicated that while CS, AS, and AR teachers assigned higher grades to students 25 and older, the pattern for grades assigned by CR teachers was reversed. This was a singular, but rather pronounced, exception to the main effect associated with the age variable. No clear pattern could be discerned in an analysis of mean grades assigned by the four categories of teachers in relation to the gender variable. Nevertheless, it was interesting to note that AS and CR teachers tended to assign higher grades to male students while CS and AR teachers tended to assign higher grades to female students.

Insert Table 2 about here

Table 2 depicts the findings from the analysis of the second ANOVA model. In this analysis, neither the learning styles of students nor the match or mismatch between students' styles and those of their instructors were associated with any significant main effects on course grade. The interaction effect between the two variables, however, was significant ($F = 2.59$, $p = .05$) and

was considered worthy of some note. The specific findings were particularly interesting in that they were manifested in a direction exactly opposite that implied by the related literature. Numerous authors have suggested that students whose learning style matches that of their teacher tend to attain higher grades. In this instance, that seemed to be true only for students exhibiting a CR style. Students exhibiting CS, AS, and AR styles and who were mismatched with the teaching styles of their instructors tended to receive higher grades.

Discussion

Although the generalizability of the findings is limited due to the relatively small sample, particularly the teacher sample, they are nonetheless interesting and may have implications for future research and educational practice. The finding that CS teachers may tend to assign lower grades than other teachers, for example, suggests that additional research is needed in regard to the patterns of teaching behaviors commonly demonstrated by teachers with different styles. What is it about CS teachers, for instance, which would cause them to grade students more stringently?

The findings revealed in regard to the age variable seem to hold the greatest implications for postsecondary education. Students 25 and older represent that segment of the student population in institutions of higher education in which we expect the greatest increase in enrollment. Theories of pedagogy and andragogy suggest that adult learners have needs, interests, and characteristics that are substantially different from those of the traditional college student. Institutions of higher education must consider carefully the question of individual differences and the implications of such differences for the manner in which they approach their institutional purposes and educational practices.

Although certainly not conclusive, the observation that students whose learning styles were mismatched with the styles of their teachers tended to receive higher grades is remarkable and is in distinct opposition to anything currently present in the literature. While it would be remiss to idly speculate on the possible causes and implications of this observation, further investigation in this area is clearly warranted and different research designs will be required to address this unique perspective.

References

Abraham, R. (1985). Field independence-dependence and the teaching of grammar. TESOL Quarterly, 20, 689-702.

Adams, V. M. & McLeod, D. B. (1979). The interaction of field dependence/independence and the level of guidance of mathematics instruction. Journal for Research in Mathematics Education, 10, 347-355.

Ballard, F. B. (1980). The effect of leadership styles and learning styles on student achievement in a basic business course at Florida Junior College at Jacksonville. Unpublished doctoral dissertation, Florida State University.

Canfield, A. (1980). Learning styles inventory manual. Ann Arbor, MI: Humanics Media

Claxton, C. S., & Murrell, P. H. (1987). Learning styles: Implications for improving education practices. ASHE-ERIC Higher Education Report No. 4. Washington, DC: Association for the Study of Higher Education.

Dunn, R. (1982). Teaching students through their individual learning styles: A research report. In J. W. Keefe (Ed.), Student learning styles and brain behavior (pp. 142-151). Reston, VA: National Association of Secondary School Principals.

Fox, R. D. (1984). Learning styles and instructional preferences in continuing education for health professionals: A validity study of the LSI. Adult Education Quarterly, 35, 72-85.

Keefe, J. W. (1982). Assessing student learning styles: An overview. In J. W. Keefe (Ed.) Student learning styles and brain behavior (pp. 43-53). Reston, VA: National Association of Secondary School Principals.

Gregorc, A. F. (1982a). Gregorc Style Delineator. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. F. (1982b). An adult's guide to style. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. F. (1982c). Gregorc Style Delineator: Development, technical, and administrative manual. Maynard, MA: Gabriel Systems, Inc.

Joniak, A. J. & Isaksen, S. G. (1988). The Gregorc Style Delineator: Internal consistency and its relationship to Kirton's adaptive-innovative distinction. Educational and Psychological Measurement, 48, 1043-1049.

Lawrence, G. (1984). A synthesis of learning style research involving the MBTI. Journal of Psychological Type, 8, 2-15.

Martray, C. R. (1971). An empirical investigation into the learning styles and retention patterns of various personality types. Unpublished doctoral dissertation, University of Alabama.

McCaulley, M. H. & Natter, F. L. (1980). Psychological (Myers-Briggs) type differences in education. Gainesville, FL: Center for the Application of Psychological Type.

Merritt, S. L. (1983). Learning style preferences of baccalaureate nursing students. Nursing Research, 32(6), 367-372.

O'Brien, T. P. (1990). Construct validation of the Gregorc Style Delineator: An application of LISREL 7. Educational and Psychological Measurement, 50, 631-636.

O'Brien, T. P. (1991). Relationships among selected characteristics of college students and cognitive style preferences. College Student Journal, 25, 492-500.

O'Brien, T. P. & Wilkinson, N. C. (in press). Cognitive styles and performance on the National Council of State Boards of Nursing Licensure Examination. College Student Journal.

Ommen, J. L.; Brainhard, S. R.; & and Canfield, A. A. (1979). Learning preferences of younger and older students. Community College Frontiers, 7, 29-33.

SAS Institute (1988). SAS user's guide: Statistics (5th ed.). Cary, NC: SAS Institute.

Thompson, M. J. (1989, Fall). Validation of the Gregorc learning style model. Occupational Education Forum, 18 (1), 27-37.

Witkin, H. A. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick and associates (Eds.), Individuality in learning. San Francisco, CA: Jossey-Bass.

Witkin, H. A.; Goodenough, D. R.; & Karp, S. A. (1967). Stability of cognitive style from childhood to young adulthood. Journal of Personality and Social Psychology, 7, 291-300.

Table 1

Effects of Selected Teacher and Student Variables on Course Grade

Source	df	SS	F	P
Teaching Style	3	1574.80	5.30	.00
Student Learning Style	4	265.29	0.67	.61
Age Group	1	690.46	6.97	.01
Student Gender	1	29.00	0.29	.59
Teaching Style x Learning Style	12	1505.16	1.27	.24
Teaching Style x Age Group	3	1201.81	4.04	.01
Teaching Style x Student Gender	3	1381.92	4.65	.00

Table 2

Effects of Student Learning Style and Teacher Match/Mismatch on Course Grade

Source	df	SS	F	P
Student Learning Style	4	277.64	0.60	.67
Teacher Match/Mismatch	1	183.10	1.57	.21
Student Style x Teacher Match/Mismatch	3	902.10	2.59	.05

ERIC Clearinghouse for Junior Colleges
JUN 14 1991